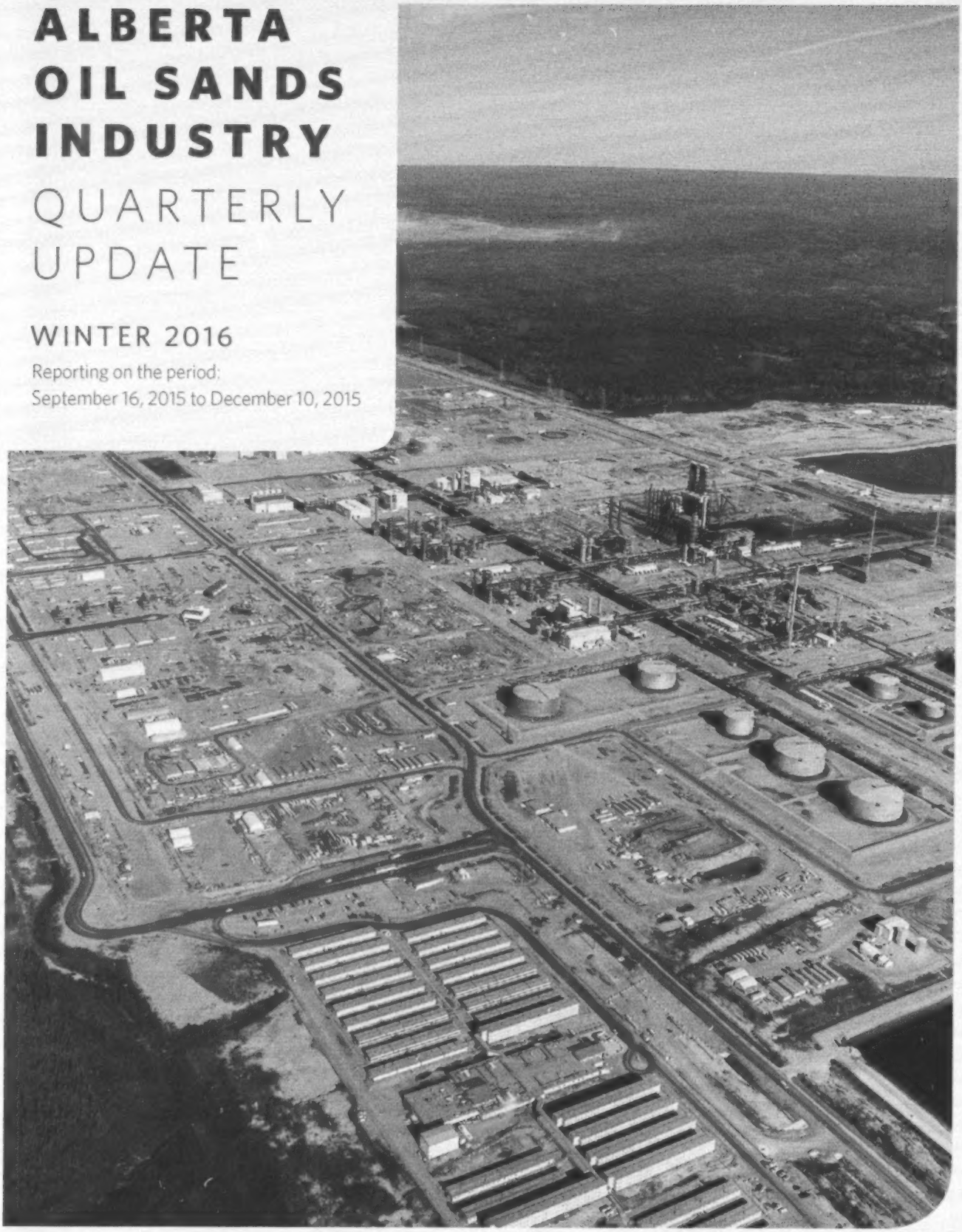
ALBERTA OIL SANDS INDUSTRY QUARTERLY UPDATE

WINTER 2016

Reporting on the period:
September 16, 2015 to December 10, 2015



All about the oil sands

Background of an important global resource

Canada has the third-largest oil reserves in the world, after Saudi Arabia and Venezuela. Of Canada's 173 billion barrels of oil reserves, 170 billion barrels are located in Alberta, and about 168 billion barrels are recoverable from bitumen. This is a resource that has been developed for decades but is now gaining increased global attention as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 168 billion barrels of bitumen represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be significantly increased. In fact, total oil sands reserves in place are estimated at 1.8 trillion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, which is located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest-central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

For the first time in 2012, in situ oil sands production exceeded mined oil sands production in Alberta. In 2014, 58 per cent of the province's oil sands volumes were produced using in situ methods. Alberta will continue to rely to a greater extent on in situ production in the future, as 80 per cent of the province's proven bitumen reserves are too deep under-ground to recover using mining methods.

There are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and the melted bitumen flows into the lower well via gravity and is pumped to the surface using artificial lift.

Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The selection is based on a number of factors, including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production, including variations on solvent-assisted SAGD and CSS, recovery using electricity and in situ combustion.

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil, which is a refinery feedstock. That can be transformed into transportation fuels and other products. ■

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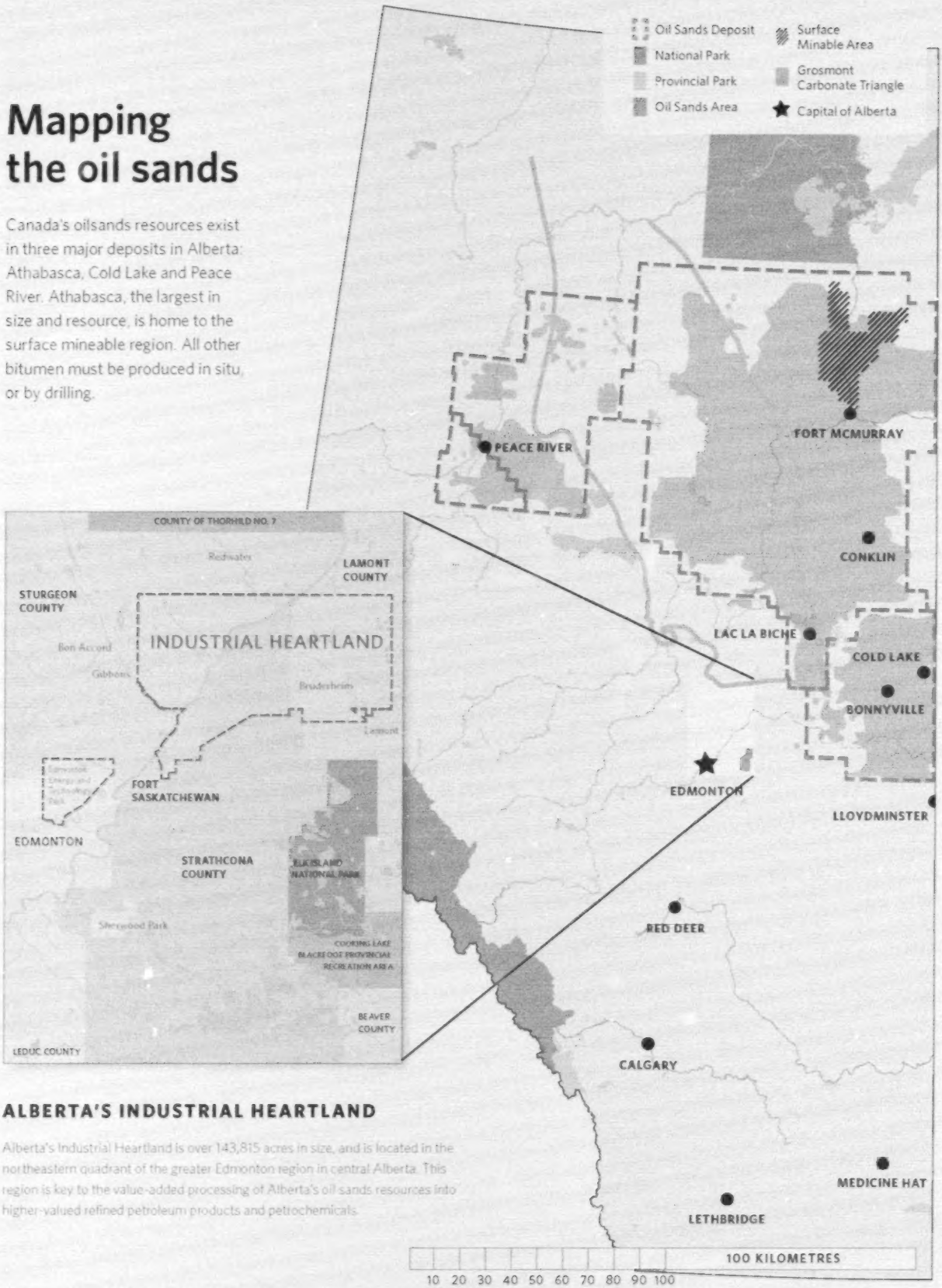
Unless otherwise noted, all photos courtesy Jane Warren, Noble Energy Group © 2015

On the cover: An aerial shot of ConocoPhillips Canada's FR3000 Steam Assisted Gravity Drainage project, which started producing bitumen in September. ConocoPhillips Canada

Mapping the oil sands

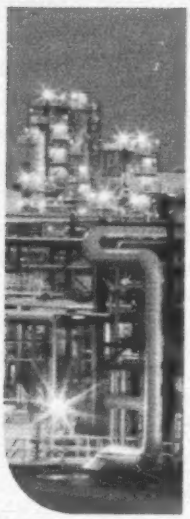
Canada's oilsands resources exist in three major deposits in Alberta: Athabasca, Cold Lake and Peace River. Athabasca, the largest in size and resource, is home to the surface mineable region. All other bitumen must be produced in situ, or by drilling.



ALBERTA'S INDUSTRIAL HEARTLAND

Alberta's Industrial Heartland is over 143,815 acres in size, and is located in the northeastern quadrant of the greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher-valued refined petroleum products and petrochemicals.

GOVERNMENT UPDATE | Alberta Government



CLIMATE LEADERSHIP PLAN WILL PROTECT ALBERTANS' HEALTH, ENVIRONMENT AND ECONOMY

Alberta's Climate Leadership Plan accelerates the transition from coal to renewable electricity sources, puts a price on carbon pollution for everyone and sets emissions limits for the oil sands.

Other measures include broad programs to improve energy efficiency, support green technological innovations, reduce methane and provide support to ensure that families and small businesses are protected. (View news conference here.)

"Responding to climate change is about doing what's right for future generations of Albertans—protecting our jobs, health and the environment. It will help us access new markets for our energy products and diversify our economy with renewable energy and energy efficiency technology. Alberta is showing leadership on one of the world's biggest problems, and doing our part," Premier Rachel Notley said.

The plan is based on the advice of the Climate Change Advisory Panel, led by Andrew Leach, which heard from thousands of individual Albertans and stakeholder groups this fall.

"I thank the panel members and the many Albertans, including Indigenous people, industry, environmental groups, municipalities and other partners and stakeholders, for their contribution. This is the right plan for our province, and now is the right time to implement it," said Shannon Phillips, minister of environment and parks.

On the advice of leaders from the provincial energy industry and from civil society, the government will legislate an overall oil sands emissions limit. The province will grow its economy by applying technology to reduce the carbon output per barrel, which is what this limit will promote.

"The announcement is a significant step forward for Alberta. We appreciate the strong leadership demonstrated by Premier Notley and her government. The framework announced will allow ongoing innovation and technology investment in the oil and natural gas sector. In this way, we will do our part to address climate change while protecting jobs and industry competitiveness in Alberta," said Murray Edwards, chair, Canadian Natural Resources Limited.

Ed Whittingham, executive director of the Pembina Institute, said Alberta is now taking its rightful place as a leader on the world stage.

"Premier Notley promised Albertans leadership on the issue of climate change and she and her government have delivered. This is the right thing to do for both for our environment and our economy. The world needs more of this kind of leadership from major energy-producing jurisdictions if we are to avoid dangerous climate change," he said.

ADAPTING TO A LOW-CARBON ECONOMY

Alberta's new climate change plan includes achievable carbon pollution reduction measures, while using revenues from the plan to help the province adapt and thrive in a lower-carbon economy.

Electricity and renewables

- Alberta will phase out all pollution created by burning coal and transition to more renewable energy and natural gas generation by 2030.
- Three principles will shape the coal phase-out: maintaining reliability, providing reasonable stability in prices to consumers and business, and ensuring that capital is not unnecessarily stranded.
- Two-thirds of coal-generated electricity will be replaced by renewables—primarily wind power—while natural gas generation will continue to provide firm base load reliability.
- Renewable energy sources will comprise up to 30 per cent of Alberta's electricity production by 2030.

Carbon pricing

- A price on carbon provides an incentive for everyone to reduce greenhouse gas pollution that causes climate change.
- Alberta will phase in this pricing in two steps:
  - $20/tonne economy-wide in January 2017
  - $30/tonne economy-wide in January 2018
- An overall oil sands emission limit of 100 megatonnes will be set, with provisions for new upgrading and cogeneration.

Methane reduction

- In collaboration with industry, environmental organizations and affected First Nations, Alberta will implement a methane-reduction strategy to reduce emissions by 45 per cent from 2014 levels by 2025.

Revenue neutral

- One hundred per cent of proceeds from carbon pricing will be reinvested in Alberta.
- A portion of collected revenues will be invested directly into measures to reduce pollution, including clean energy research and technology, green infrastructure such as public transit, and programs to help Albertans reduce their energy use.
- Other revenues will be invested in an adjustment fund that will help individuals and families make ends meet, providing transition support to small businesses, First Nations, and people working in affected coal facilities.

"We are going to do our part to address one of the world's greatest problems. We are going to put capital to work, investing in new technologies, better efficiency and job-creating investments in green infrastructure. We are going to write a made-in-Alberta policy that works for our province and our industries and keeps our capital here in Alberta," said Premier Rachel Notley.

STATEMENT FROM PREMIER NOTLEY ON KEYSTONE XL

Premier Rachel Notley issued the following statement on November 6, 2015, on the U.S. decision regarding the proposed Keystone XL pipeline:

"Though I am not surprised by the news coming from the White House this morning, as we have anticipated this announcement for some time, I am disappointed by the way the U.S. government chose to characterize our energy exports.

"The decision today underlines the need to improve our environmental record and reputation so that we can achieve our goal of building Canada's energy infrastructure, including pipelines to new markets.

"This highlights that we need to do a better job, and that's why I'm so pleased about the work that is ongoing towards a new climate change plan for Alberta. We're working hard with stakeholders, and we intend to act decisively to increase the likelihood of getting our product to tidewater.

"I spoke with Prime Minister Trudeau this morning about building this infrastructure, which should continue to be a national priority. I reinforced that both the Alberta and Canadian economies need infrastructure that get Alberta's energy resources to tidewater, and he agreed that we need to work collaboratively.

"Canada can be a global source of environmentally responsible energy through better environmental policies, and Alberta will act to help make that happen in partnership with Canada's new federal government.

"And then we hope that future energy infrastructure projects will be debated on their own merits.

"Canada currently exports over three million barrels a day to the U.S., and those exports will continue. Our trading relationship with the United States is of fundamental importance to Alberta, and we will work to build on it.

"Alberta's energy industry is important to families here and across the country, and I will work hard every day to support its sustainability."

PROVINCE BUDGETING FOR LOWER NON-RENEWABLE RESOURCE REVENUE

The Alberta government is forecasting total non-renewable resource revenue to plunge to $2.77 billion for the 2015-16 fiscal year, nearly 70 per cent lower than the $8.95 billion collected in 2014-15.

The Government of Alberta forecasts a budget deficit of $6.1 billion for the fiscal year that ends on March 31, 2016. It plans to run deficits until 2018-19, then expects to post a balanced budget in 2019-20.

Non-renewable resource revenue in 2015-16 will account for 6.3 per cent of total revenue, though its share is expected to grow to 9.1 per cent by 2017-18.

Resource revenue is estimated to increase by an average of 26 per cent per year between 2015-16 and 2017-18, to $4.37 billion, with substantial growth in bitumen royalties. The resource revenue forecast for 2017-18 is still less than half of actual 2014-15 revenue.

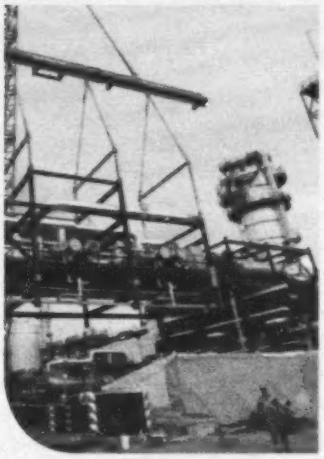
Real gross domestic product is estimated to contract one per cent in 2015 due to the collapse in oil prices and drop in energy investment. Corporate profits and Alberta government revenue "will be hit particularly hard by the weaker outlook for oil prices," the province noted in its budget. The economy is forecast to expand in 2016, but at a relatively slow pace of 0.9 per cent, reflecting the lagged effects of lower oil prices on employment, housing and consumer spending.

In 2017 and 2018, growth is expected to accelerate to around 2.5 per cent, supported by gradually rising oil prices, weaker cost pressures, a stronger U.S. economy and a low Canadian dollar.

"Energy is going to be Alberta's business and the heart of our economy and our economic development for many decades to come," said Finance Minister Joe Ceci during his budget speech. "But jobs and diversification must also be at the top of our agenda this year and every year from now on.

"Albertans are well aware that the recent drop in the price of oil is presenting our province with a serious challenge." ■

LABOUR UPDATE



DEMAND FOR SKILLED WORKFORCE REMAINS STRONG

The growing technical and business complexities of Canada's oil and gas industry, together with the need to remain competitive internationally, is driving demand for a more skilled and knowledgeable workforce, according to a report released by the Petroleum Labour Market Information (PetroLMI) Division of Enform.

The report, *HR Trends and Insights: Shifting Priorities and a Shifting Workforce*, examines three key business shifts that Canada's oil and gas industry has witnessed in recent years: new technologies designed to access harder-to-reach reserves, cost-management strategies intended to simultaneously improve returns and productivity, and the need to diversify into new and expanded markets.

"With these three significant shifts has come the need for new and more intricate skills as well as different occupational requirements. The worker of today is quite different than the one from a decade or more ago. New entrants need to be more familiar with technology of all types," says Carol Howes, vice-president of communications and PetroLMI, Enform.

"Many of today's workers require business acumen and negotiating skills. And, with an increased focus on building new infrastructure, safety and environmental issues, comes requirements for more specialists such as those in well abandonment and reclamation, or stakeholder and Aboriginal relations."

According to the report, the ability to tap into unconventional reserves using innovative technology has significantly altered the types of equipment, materials and services now required to support much of Canada's oil and gas development. Likewise, the need to balance performance with cost reductions calls for more supply chain and logistics specialists as companies centralize supply chain management to realize economies of scale. Similarly, in its desire to reach new offshore markets, the industry will require a workforce with a new set of skills and knowledge in liquefied natural gas.

Many of today's oil and gas workers must be highly skilled at reading, numeracy, communicating and problem solving. They may have to plan and execute projects of all sizes and understand the cost implications or the regulatory requirements, notes the report.

DESPITE THE DOWNTURN, EMPLOYEE TRAINING AND PROFESSIONAL DEVELOPMENT REMAIN KEY

Cuts to training and professional development budgets for employees during the downturn could save oil and gas companies money in the short term, but cost them a lot more in the long-term, warns a Calgary recruitment consultant.

"The skills shortage is going to be exacerbated when we come out of this downturn and [companies] are not doing what they can to help themselves upskill their workforce that is going to be with them," says Jim Fearon, vice-president, central region for Hays Canada, part of a global recruiting firm.

In its sixth annual salary guide, Hays found that only two per cent of those surveyed are taking any additional measures to enhance the skills of their staff even though 57 per cent of respondents believe the industry suffers from a moderate to extreme skills shortage due to a lack of training and development.

Conducted in October 2015, the Hays salary guide highlights employer confidence, a look at business expectations versus results, and a snapshot of hiring trends and challenges.

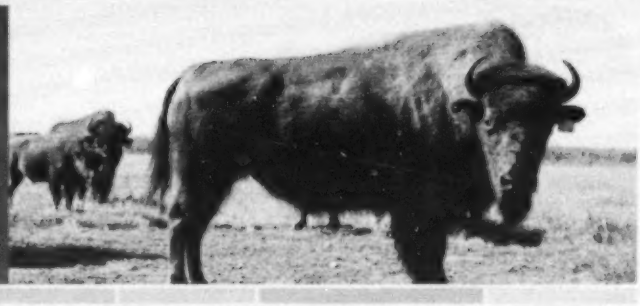
"One of the big opportunities that I think is going to get lost is that so few companies in the industry invest in training and developing their own staff," says Fearon.

"The downturn is an opportunity to upskill your existing staff. You are not hiring new people and maybe you are making layoffs but can you invest some time and money in developing the...skill set of your existing staff?"

Companies that do so, Fearon suggests, will find that when the market recovers and starts to pick up, they will have people with greater capabilities and capacities and a greater understanding of the business who may be able to step up into more senior roles. ■

WHAT'S NEW IN THE OIL SANDS

BUSINESS



Oil sands heavyweights are applauding the Alberta government's new climate change strategy with guarded optimism; however, sector leaders say more concrete details need to be fleshed out before the true ramifications of the plan are known.

The government unveiled its climate change management in November, an ambitious plan that includes a legislated emissions limit on the oil sands, a carbon price across all sectors, and pledges to reduce methane emissions from oil and gas operations.

In a joint news release, four of Canada's largest oil sands producers—Canadian Natural Resources Limited, Cenovus Energy, Shell Canada and Suncor Energy—said they support Alberta's climate plan relating to the oil and natural gas industry.

The companies agree that this is an "historic development for Alberta and Canada" that will change the conversation about climate change, oil sands and infrastructure.

"Industry has seen results from working together," said Murray Edwards, chair, Canadian Natural.

"This announcement removes barriers for collaboration with a broader group of stakeholders. We are all now working together to realize the full value provided by the oil and natural gas industry—including jobs, economic benefits and government revenues—in a way that addresses the challenges associated with climate change."

Brian Ferguson, president and chief executive officer of Cenovus Energy, said his company fully supports the government's new climate policy direction.

"It enables Alberta to be a leader, not only in climate policy, but also in technology, innovation, collaborative solutions and energy development. I believe it will lead to Albertans and Canadians receiving full value for their oil and natural gas resources, while addressing climate change."

MEG Energy has formed a committee of the board of directors and has retained BMO Capital Markets and Credit Suisse to review options available to the company to use its interest in the Access Pipeline to reduce the financial leverage of the corporation.

MEG shares 50/50 ownership in the pipeline with Devon Canada. Access connects MEG's Christina Lake SAGD project and Devon's Jackfish SAGD project with terminals in the Edmonton region.

MEG says that undertaking this deleveraging process will enhance its financial and operational profile in the current low commodity price environment and better position it to move forward with its growth plans once prices improve. Devon is also reportedly looking to sell its share in the Access Pipeline.

Junior oil sands developer SilverWillow Energy says it has agreed to be acquired by privately held Value Creation for $1.7 million. SilverWillow oil sands leases consisted of 100 per cent working interest in 140,160 acres in the Athabasca region, including the proposed 12,000-bbl/d Audet SAGD project.

"Although the board of directors is disappointed that the company could not achieve greater recovery of value for its shareholders, and that the transaction price per share represents a discount to the current market price, it has determined that the transaction is the best way forward at this time given the current difficult conditions and limited options available to the company," SilverWillow says.

The limited access to global and domestic markets could emerge as a long-term constraint on Alberta crude oil production, says the International Energy Agency (IEA) in its *World Energy Outlook 2015*.

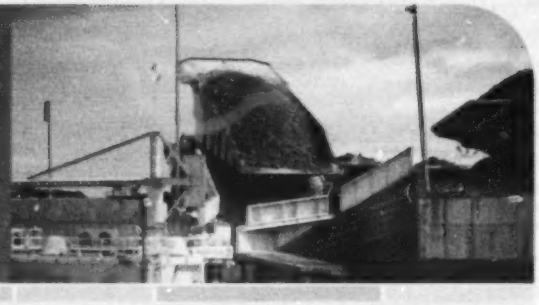
The agency has marginally reduced Canada's 2020 forecast output of 5.1 million bbls/d, remaining up from 2014. Total Canadian production is forecast to grow to 5.5 million bbls/d in 2025, to 5.8 million bbls/d in 2030 and 6.8 million bbls/d in 2040 as oil sands production accounts for a growing percentage of the total.

The IEA points out that Canada has seen postponements of multiple upstream projects, mainly oil sands, since oil prices started falling in 2014, but this takes time to feed through the system because of the long lead times for new investment.

The IEA forecasts that the market rebalances at $80/bbl in 2020, with further increases in price to $128/bbl by 2040.

WHAT'S NEW IN THE OIL SANDS

TECHNOLOGY



■ GE has announced three winners in the final phase of its GHG Ecomagination Innovation Challenge targeting greenhouse gas emissions from the oil sands. With two winners from the U.S. and one from France, GE says the technologies best respond to the challenge of improving the efficiency of SAGD operations.

The winners are Sidel Systems USA, UVHC and SINHATECH. These companies now have the opportunity to create co-development plans with GE and other potential partners that will draw on a C$475,000 directed development grant pool.

GE says the proposed technologies have been proven in other industries and potentially can be used to enhance the efficiency of once-through steam generators (OTSG) for SAGD.

■ Canada's Oil Sands Innovation Alliance (COSIA) is co-sponsoring a $20-million challenge with NRG Energy that calls on teams to develop breakthrough technologies to convert the most CO_2 possible into products with high net value.

"We are part of the global problem, but today is about becoming part of the global solution," Dan Wicklum, chief executive officer at COSIA, told media during the Calgary launch of the Carbon XPRIZE. The 4.5-year XPRIZE competition includes two tracks, with new technologies tested at either a coal power plant or natural gas facility. Teams must demonstrate their innovations at one or both of the facilities. A $7.5-million grand prize purse will be awarded to the winners of each track.

The Carbon XPRIZE aims to incentivize breakthrough technologies that convert CO_2 into new products, such as alternative cement, concrete and other building materials, chemicals used to manufacture various industrial and consumer goods, or low-carbon transportation fuels.

"We are living in an age of unprecedented technological progress and prosperity driven by energy," Peter Diamandis, chair and chief executive officer of XPRIZE, said during an announcement in Austin, Texas. "Yet most of this energy comes from burning fossil fuels, a leading contributor to climate change. We are embarking on one urgent step in XPRIZE's energy road map of incentivizing a clean and positive energy future that addresses a suite of grand challenges."

■ Royal Dutch Shell has marked the official opening of the Quest carbon capture and storage (CCS) project and its start of operations.

Quest is designed to capture and safely store more than one million tonnes of CO_2 each year, equal to the emissions from about 250,000 cars.

As part of its funding arrangements, Shell is publicly sharing information on Quest's design and processes to further global adoption of CCS, one of the only industrial technologies that can significantly reduce carbon emissions. Quest draws on techniques used by the energy industry for decades and integrates the components of CCS for the large-scale capture, transport and storage of CO_2.

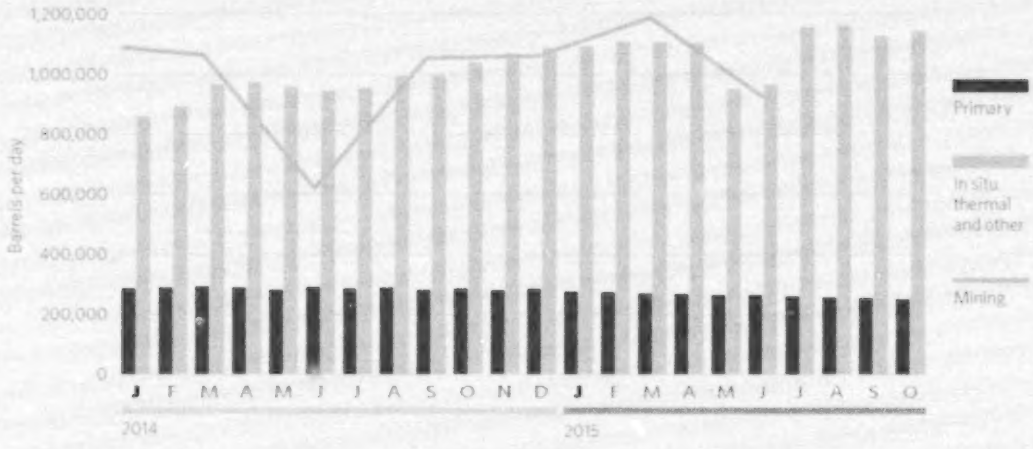
■ E-T Energy and Bayshore Petroleum have announced plans to merge and demonstrate their proprietary oil sands production technologies. Subject to raising the required financing, during the second half of 2016 the companies plan to restart bitumen production at Poplar Creek using E-T's proprietary electro-thermal dynamic stripping process technology and Bayshore's catalyst-based in situ cold catalytic cracking (CCC) upgrading technology and ultrasonic technology.

E-T and Bayshore believe that combining these technologies will produce in situ improvements in bitumen viscosity and density, allowing partially upgraded bitumen to flow to surface. It is intended that this technology combination will moderate or solve operational challenges that previously impeded full production at the Poplar Creek property.

The companies, which will continue operations as Bayshore, also plan to construct a CCC upgrader (and associated desulphurization equipment) designed to convert bitumen directly into diesel fuel. The CCC upgrader does not use water, hydrogen, pressure/vacuum, or temperatures above 450 degrees Celsius. The process is operational in a 50-bbl/d pilot now, and Bayshore believes it is fully scalable up to 50,000 bbls/d. The produced diesel is intended for sale in local Canadian fuel markets. ■

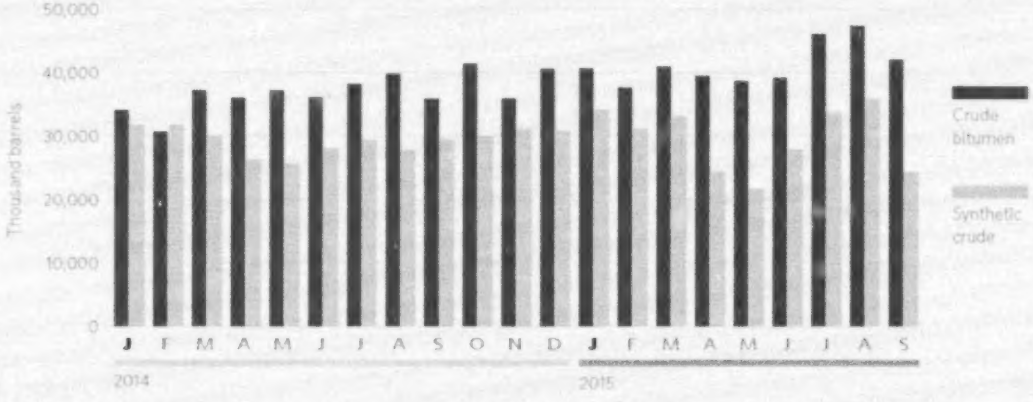
OIL SANDS PRODUCTION DATA

Alberta oil sands production by extraction method



*Mining production data for the third quarter of 2015 not available at time of publishing.

Alberta crude bitumen and synthetic crude production



OIL SANDS TECHNOLOGY LEGEND

ADC (Upgrading) Accelerated decontamination

AIRINJ Air injection

BEST Bitumen extraction solvent technology

C&SC Cyclic and solvent cyclic

C-SAGD Cyclic steam assisted gravity drainage

CSS Cyclic steam stimulation

ESEIEH Enhanced solvent extraction incorporating electromagnetic heating

ET-DSP Electro-thermal dynamic stripping

HCSS Horizontal cyclic steam stimulation

HTL Heavy-to-light upgrading process

In situ Production technology undisclosed; will use drilling and enhanced recovery

LP-SAGD Low-pressure steam assisted gravity drainage

Mining Truck and shovel mining

Orcrude Primary upgrading process

SAGD Steam assisted gravity drainage

SAP Solvent aided process

SC-SAGD Solvent cyclic steam assisted gravity drainage

TAGD Thermal assisted gravity drainage

THAI Toe to heel air injection

UPG Bitumen upgrading

USP (Upgrading) Ultra-selective pyrolysis

VSD Vertical steam drive

PROJECT LISTINGS

Updated status of oil sands projects in Alberta | As of December 2015

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION — MINING				
Canadian Natural Resources Limited				
Horizon				
Canadian Natural plans to exit 2015 with Horizon volumes at 170,000 bbls/d and the Phase 3 expansion well advanced toward completion in Q4/17.				
Phase 1	135,000	2008	Operating	Mining
Reliability – Tranche 2	5,000	2014	Operating	Mining
Phase 2A	12,000	2014	Operating	Mining
Phase 2B	45,000	2016	Construction	Mining
Phase 3	80,000	2017	Construction	Mining
Imperial Oil Limited				
Kearl				
Imperial says that Kearl bitumen production averaged 181,000 bbls/d in Q3, including the impact of major maintenance performed in September. Q3 was the first full quarter of operations from the Kearl 2 expansion project.				
Phase 1	110,000	2013	Operating	Mining
Phase 2	110,000	2015	Operating	Mining
Phase 3	80,000	TBD	On Hold	Mining
Phase 4 Debottleneck	45,000	TBD	On Hold	Mining
Shell Albian Sands				
Jackpine				
Phase 1A	100,000	2010	Operating	Mining
Phase 1B	100,000	TBD	Approved	Mining
Expansion	100,000	TBD	Approved	Mining
Muskeg River				
Project partner Marathon Oil says that record production of approximately 285,000 bbls/d during Q3 was largely due to improved operational reliability and no planned maintenance.				
Commercial	155,000	2002	Operating	Mining
Expansion & Debottlenecking	115,000	TBD	Approved	Mining
Pierre River				
Shell has withdrawn its application for the Pierre River project, saying it wants to focus on its existing oilsands operations. The company says it will continue to hold the Pierre River leases and may re-apply in the future.				
Phase 1	100,000	TBD	Cancelled	Mining
Phase 2	100,000	TBD	Cancelled	Mining
Suncor Energy Inc.				
Base Operations				
Suncor says that its overall oilsands production increased to 430,000 bbls/d in Q3 compared to 411,700 bbls/d in Q3/2014 due to higher in situ production and reliable operations across all assets. Both quarters included major planned maintenance.				
Millennium Mine	294,000	1967	Operating	Mining
Steepbank Debottleneck Phase 3	4,000	2007	Operating	Mining
Millennium Debottlenecking	23,000	2008	Operating	Mining
North Steepbank Extension	180,000	2012	Operating	Mining
Fort Hills				
Suncor has closed its acquisition of an additional 10 per cent working interest in the Fort Hills project from Total E&P Canada for $310 million. The transaction leaves the ownership as Suncor Energy 50.8 per cent, Total 29.2 per cent, and Teck Resources 20 per cent. The project remains on schedule with detailed engineering 94 per cent complete and construction 43 per cent complete at the end of Q3.				
Phase 1	160,000	2017	Construction	Mining
Debottleneck	20,000	TBD	Approved	Mining
Voyageur South				
Suncor considers Voyageur South to be a "longer-term" project and has not confirmed a start-up date.				
Phase 1	250,000	2024	Announced	Mining

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
Canadian Oil Sands says that production during Q3 was impacted by a process fire in the interconnecting piping between the hydrotreating and environmental units at Syncrude's upgrader, which limited SCO shipments to minimal levels while damage was assessed and repaired. The company says that Syncrude is entering a new era of low cost operations, following a major period of reinvestment that will sustain production for decades.				
Base Mine Stage 1 & 2 Expansion	290,700	1978	Operating	Mining
Stage 3 Expansion	116,300	2006	Operating	Mining
Centrifuge Tailings Management	TBD	TBD	Operating	Mining
Aurora South Train 1	100,000	TBD	Approved	Mining
Aurora South Train 2	100,000	TBD	Approved	Mining
Mildred Lake Mine Extension (MLX)	184,000	2023	Application	Mining
Teck Resources Limited				
Frontier				
Teck has filed a project update for the Frontier mining development. The capital cost has been increased to $20.6 billion and the total capacity is now 260,000 bbls/d. Alberta Environment and Parks says that supplemental information responses regarding the Frontier application/EIA are now under review.				
Phase 1a	86,000	2026	Application	Mining
Phase 1b	85,000	2027	Application	Mining
Phase 2	90,000	2037	Application	Mining
Total E&P Canada Ltd.				
Joslyn North Mine				
Total has withdrawn the regulatory applications for the Joslyn North Mine.				
Phase 1	100,000	TBD	On Hold	Mining
NORTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Birch				
Athabasca lists Birch as one of its long term assets.				
Phase 1	12,000	TBD	Announced	SAGD
Dover West Carbonates (Leduc)				
Athabasca lists Dover West as one of its long term assets.				
Phase 1 Demonstration	6,000	TBD	Approved	SAGD
Phase 2 Demonstration	6,000			SAGD
Dover West Sands & Clastics				
Athabasca lists Dover West as one of its long term assets.				
Phase 1	12,000	TBD	Application	SAGD
Phase 2	35,000	2019	Announced	SAGD
Phase 3	35,000	2020	Announced	SAGD
Phase 4	35,000	2022	Announced	SAGD
Phase 5	35,000	2024	Announced	SAGD
BP p.l.c.				
Terre de Grace				
BP stated in late 2014 that it is unlikely that Terre de Grace would come online before 2020.				
Pilot	10,000	TBD	Approved	SAGD
Brion Energy Corporation				
Dover				
Dover Experimental Pilot	2,000	2017	Approved	SAGD
Dover North Phase 1	50,000	TBD	Approved	SAGD
Dover North Phase 2	50,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Dover (continued)				
Dover South Phase 3	50,000	2021	Approved	SAGD
Dover South Phase 4	50,000	2023	Approved	SAGD
Dover South Phase 5	50,000	2025	Approved	SAGD
MacKay River				
Phase 1	35,000	2015	Construction	SAGD
Phase 2	40,000	TBD	Approved	SAGD
Phase 3	40,000	2020	Approved	SAGD
Phase 4	35,000	2022	Approved	SAGD
Canadian Natural Resources Limited				
Birch Mountain				
Phase 1	60,000	TBD	Announced	SAGD
Phase 2	60,000	TBD	Announced	SAGD
Cenovus Energy Inc.				
East McMurray				
Phase 1	30,000	TBD	Announced	SAGD
Steepbank				
Phase 1	30,000	TBD	Announced	SAGD
Telephone Lake				
Cenovus says it continues to review development options for Telephone Lake after receiving regulatory approval in late 2014.				
Phase A	45,000	TBD	On Hold	SAGD
Phase B	45,000	TBD	Approved	SAGD
E-T Energy Ltd.				
Poplar Creek				
Bayshore Petroleum Corp. announces it has entered into a MOU with E-T Energy Ltd. to raise capital and implement a construction and operations program. The two objectives are to restart bitumen production at Poplar Creek during the second half of 2016, using E-T's proprietary ET-DSP technology and Bayshore's catalyst based in situ cold catalytic cracking (CCC) upgrading technology and ultrasonic technology. The second objective is to construct a CCC upgrader designed to convert bitumen directly into ultra-low sulphur commercial diesel. The CCC upgrader does not use water, hydrogen, pressure/vacuum, or temperatures above 450 degrees Celsius. The produced diesel is intended for sale in local Canadian energy markets. Bayshore will issue, in due course, a comprehensive news release incorporating more detail of the project and transaction. One or more aspects of the final agreement may be subject to regulatory review and approval.				
Experimental Pilot	1,000	2012	Suspended	ET-DSP
Grizzly Oil Sands ULC				
Thickwood				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oil sands projects in the new "shallow thermal area" of the Athabasca region until it has developed formal regulatory requirements. Grizzly Thickwood is one of five impacted projects.				
Phase 1	6,000	TBD	Application	SC-SAGD
Phase 2	6,000	TBD	Application	SC-SAGD
Husky Energy Inc.				
Saleski				
Husky filed the regulatory application for its Saleski pilot in early May 2013.				
Carbonate Pilot	3,000	TBD	Application	SC-SAGD
Sunrise				
Husky says that Sunrise is steadily ramping up towards expected capacity of about 60,000 bbls/day (30,000 bbls/day net to Husky) around the end of 2016. Steam operations have begun at Plant 1B, production is expected late 2015.				
Phase 1A	30,000	2015	Operating	SAGD
Phase 1B	30,000	2015	Construction	SAGD
Phase 2A	35,000	TBD	On Hold	SAGD
Phase 2B	35,000	TBD	Approved	SAGD
Future Phases	70,000	TBD	Approved	SAGD
Imperial Oil Limited				
Aspen				
Imperial has amended its regulatory application for Aspen to use solvent-assisted SAGD versus conventional SAGD. Aspen is now proposed to be executed in two phases of 75,000 bbls/d, with development timing subject to regulatory approvals and market conditions. A final investment decision could be made as early as 2017.				
Phase 1	75,000	2020	Application	SAGD
Phase 2	75,000	TBD	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Ivanhoe Energy Inc.				
Tamarack				
Ivanhoe has announced that despite considerable efforts by the company, its trustee and major creditors, the parties have been unable to reach a viable restructuring proposal under the Bankruptcy and Insolvency Act. The company was deemed bankrupt as of 11:59 p.m. MDT on June 1, 2015.				
Phase 1	20,000	TBD	Application	SAGD
Phase 2	20,000	TBD	Application	SAGD
Koch Exploration Canada Corporation				
Dunkirk				
Koch has filed the regulatory application for the proposed Dunkirk SAGD project.				
Commercial Demonstration	2,000	2017	Application	SAGD
Phase 1	30,000	2018	Announced	SAGD
Phase 2	30,000	TBD	Announced	SAGD
Marathon Oil Corporation				
Birchwood				
Marathon had anticipated receiving regulatory approval for the Birchwood project by the end of 2014. Upon receiving this approval, the company will further evaluate its development plans.				
Demonstration	12,000	TBD	Application	SAGD
Oak Point Energy Ltd.				
Lewis				
Oak Point Energy says the Lewis project is well positioned (no additional work required) for exploitation when oil prices recover.				
Pilot	1,720	TBD	Approved	SAGD
Prosper Petroleum Ltd.				
Rigel				
Prosper Petroleum filed its regulatory application for the Rigel SAGD project in November 2013. Regulatory approval is expected in second half of 2015.				
Phase 1	10,000	2017	Application	SAGD
Southern Pacific Resource Corp.				
STP-McKay				
Southern Pacific and certain of its subsidiaries have obtained creditor protection under the Companies' Creditors Arrangement Act. The STP McKay is being suspended to preserve capital until oil prices recover.				
Phase 1	12,000	2012	Suspended	SAGD
Suncor Energy Inc.				
Dover				
N-Solv Corporation says that since start up in Q2/2015, the pilot plant has produced over 60,000 bbls of oil.				
BEST Pilot	300	2014	Operating	BEST
ESEIEH Pilot	TBD	TBD	Operating	ESEIEH
Firebag				
Suncor says that work at Firebag continues to focus on well pad construction to sustain existing production, and on multiple projects to enhance safety, reliability and environmental performance.				
Stage 1	35,000	2004	Operating	SAGD
Stage 2	35,000	2006	Operating	SAGD
Cogeneration and Expansion	25,000	2007	Operating	SAGD
Stage 3	42,500	2011	Operating	SAGD
Stage 4	42,500	2012	Operating	SAGD
Stage 5	62,500	TBD	Approved	SAGD
Stage 6	62,500	TBD	Approved	SAGD
Stage 3 – 6 Debottleneck	23,000	TBD	Application	SAGD
Lewis				
Phase 1	40,000	TBD	Announced	IN SITU
Phase 2	40,000	TBD	Announced	IN SITU
MacKay River				
Suncor says that spending is currently focused on ongoing well pad construction to maintain existing production levels.				
Phase 1	33,000	2002	Operating	SAGD
Debottleneck	5,000	2014	Operating	SAGD
MR2	20,000	TBD	On Hold	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Sunshine Oilsands Ltd.				
Legend Lake				
Phase A1	10,000	TBD	Application	SAGD
Phase A2	30,000	TBD	Announced	SAGD
Phase B1	30,000	TBD	Announced	SAGD
Phase B2	30,000	TBD	Announced	SAGD
Thickwood				
Phase A1	10,000	TBD	Approved	SAGD
Phase A2	30,000	TBD	Announced	SAGD
Phase B	30,000	2021	Announced	SAGD
West Ells				
Sunshine says that first oil was achieved at West Ells in December 2015.				
Phase A1	5,000	2015	Operating	SAGD
Phase A2	5,000	TBD	Approved	SAGD
Phase A3	30,000	TBD	Announced	SAGD
Phase B	20,000	TBD	Announced	SAGD
Phase C1	30,000	TBD	Announced	SAGD
Phase C2	30,000	TBD	Announced	SAGD
Value Creation Inc.				
Audet				
Value Creation has acquired SilverWillow Energy and its Audet project.				
Pilot	12,000	TBD	Application	SAGD
SOUTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Hangingstone				
The company says that initial production ramp-up continues to progress, and has updated its thermal oil exit guidance to between 5,000-7,000 bbls/d (up from 3,000-6,000 bbls/d. The Environmental Impact Assessment director has deemed the EIA report complete for the Hangingstone expansion project.				
HS-1	12,000	2015	Operating	SAGD
HS-2A Debottleneck (1 and 2)	8,000	TBD	Application	SAGD
HS-2B Expansion	32,000	2019	Application	SAGD
HS-3	30,000	2021	Application	SAGD
BlackPearl Resources Inc.				
Blackrod				
BlackPearl says that results from the second pilot SAGD well pair continue to be positive, producing in excess of 550 bbls/d with an SOR of 2.6. There have been no new updates regarding the status of its 80,000 bbl/d commercial application, which is under review by the AER.				
Pilot	800	2011	Operating	SAGD
Phase 1	20,000	TBD	Application	SAGD
Phase 2	30,000	TBD	Application	SAGD
Phase 3	30,000	TBD	Application	SAGD
Canadian Natural Resources Limited				
Gregoire Lake				
Phase 1	60,000	TBD	Announced	SAGD
Phase 2	60,000	TBD	Announced	SAGD
Grouse				
Canadian Natural lists the first phase of Gregoire in its growth plan following construction of Kirby North Phase 1, which was suspended early in 2015 due to market conditions.				
Commercial	40,000	2020	Application	SAGD
Kirby				
The company says that Kirby South continues to ramp up to nameplate capacity of 40,000 bbls/d. Q3/15 production volumes were 34,069 bbls/d, an increase of 88 per cent over Q3/14 and 30 per cent over Q2/15. The SOR in Q3/15 was 2.5:1.				
KS1 - Kirby South	40,000	2013	Operating	SAGD
KN1 - Kirby North	40,000	TBD	On Hold	SAGD
KN2 - Kirby North	60,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Cavalier Energy Inc.				
Hoole				
Regulatory approval for the first phase of the Hoole project was granted in June 2014. Development of this phase is dependent upon Cavalier Energy securing financing and sanctioning by its board of directors. In July 2014, Cavalier acquired approximately 23 net sections of undeveloped land contiguous with its Hoole lands for $20 million.				
Phase 1	10,000	TBD	Approved	SAGD
Phase 2A	35,000	TBD	Announced	SAGD
Phase 2B	35,000	TBD	Announced	SAGD
Cenovus Energy Inc.				
Christina Lake				
Cenovus says that its optimization project at Christina Lake was completed on time and below budget, with incremental oil production expected to ramp up over a period of 12 months. The project is designed to increase steam generating capacity and optimize oil treating. The Phase F expansion is nearing completion, with first oil expected in the second half of 2016.				
Phase 1A	10,000	2002	Operating	SAGD
Phase 1B	8,800	2008	Operating	SAGD
Phase C	40,000	2011	Operating	SAGD
Phase D	40,000	2012	Operating	SAGD
Phase E	40,000	2013	Operating	SAGD
Optimization (Phases C, D, E)	22,000	2015	Operating	SAGD
Phase F	50,000	2016	Construction	SAGD
Phase G	50,000	TBD	On Hold	SAGD
Phase H	50,000	TBD	Application	SAGD
Foster Creek				
Cenovus says that the Phase G expansion remains on track for expected production late in the first half of 2016.				
Phase A	24,000	2001	Operating	SAGD
Phase B Debottleneck	6,000	2003	Operating	SAGD
Phase C Stage 1	10,000	2005	Operating	SAGD
Phase C Stage 2	20,000	2007	Operating	SAGD
Phase D	30,000	2009	Operating	SAGD
Phase E	30,000	2009	Operating	SAGD
Phase F	30,000	2014	Operating	SAGD
Phase G	30,000	2016	Construction	SAGD
Phase H	30,000	2017	On Hold	SAGD
Future Optimization (Phases F, G, H)	35,000	TBD	Announced	SAGD
Phase J	50,000	TBD	Approved	SAGD
Future Optimization	15,000	TBD	Announced	SAGD
Grand Rapids				
Cenovus says it has completed the dismantling and storage of an existing SAGD facility that it purchased in 2014 and intends to relocate to the Grand Rapids site once the development plan has been finalized and a decision made to start investing in the project, subject to more favourable conditions.				
Pelican Lake Pilot	600	2011	Operating	SAGD
Pelican Upper Grand Rapids Phase A	10,000	TBD	On Hold	SAGD
Pelican Upper Grand Rapids Phase B	32,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase C	29,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase D	29,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase E	32,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase F	29,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase G	19,000	TBD	Approved	SAGD
Narrows Lake				
Phase A	45,000	TBD	On Hold	SAP
Phase B	45,000	TBD	Approved	SAP
Phase C	40,000	TBD	Approved	SAP

CURRENT PROJECTS	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
West Kirby				
Phase 1	30,000	TBD	Announced	SAGD
Winefred Lake				
Phase 1	30,000	TBD	Announced	SAGD
CNOOC Limited				
Long Lake				

Nexen says it has returned Long Lake to full operations following amendment orders from the Alberta Energy Regulator lifting suspension of pipeline operations. The suspension was ordered in late August after Nexen self-disclosed to the AER pipeline non-compliances, following a major spill in July.

Phase 1	72,000	2008	Suspended	SAGD
Kinosis (K1A)	20,000	2014	Suspended	SAGD
Kinosis (K1B)	37,500	TBD	Approved	SAGD
Connacher Oil and Gas Limited				
Great Divide				

Connacher has closed its recapitalization transaction, but the company says that the current economic outlook on global crude oil prices and limited access to available capital may cast significant doubt about its ability to continue as a going concern.

Pod One	10,000	2007	Operating	SAGD
Algar	10,000	2010	Operating	SAGD
Expansion 1A	12,000	TBD	Approved	SAGD
Expansion 1B	12,000	TBD	Approved	SAGD
ConocoPhillips Canada Limited				
Surmont				

ConocoPhillips says that it has achieved first production at the Surmont 2 project. Production is expected to ramp up through 2017. Alberta Environment and Parks says that supplemental information requests regarding the Surmont 3 project application/EIA were sent in March and June, and ConocoPhillips submitted information, which is now under review.

Pilot	1,200	1997	Operating	SAGD
Phase 1	30,000	2007	Operating	SAGD
Phase 2	118,000	2015	Operating	SAGD
Phase 2 Debottleneck	57,000	TBD	Application	SAGD
Phase 3 – Tranche 1	45,000	2020	Application	SAGD
Phase 3 – Tranche 2	45,000	2021	Application	SAGD
Phase 3 – Tranche 3	45,000	2023	Application	SAGD
Devon Canada Corporation				
Jackfish				

Devon says that during Q3, Canadian heavy oil production increased to a record 121,000 bbl/d. Driven by the ramp-up of the Jackfish 3 facility to nameplate capacity four months ahead of schedule, Canadian oil production increased 52 per cent compared to Q3/14.

Phase 1	35,000	2007	Operating	SAGD
Phase 2	35,000	2011	Operating	SAGD
Phase 3	35,000	2014	Operating	SAGD
Jackfish East				
Expansion	20,000	2018	Announced	SAGD
Pike				

Devon has applied to amend total capacity of the Pike project to 70,000 bbls/d from 105,000 bbls/d, using 52 well pads and 12 once-through steam generators. FEED is expected to be completed in 2015 as well as a cost structure.

1A	35,000	2019	Approved	SAGD
1B	35,000	2020	Approved	SAGD
1C	35,000	TBD	Cancelled	SAGD
Grizzly Oil Sands ULC				
Algar Lake				

Grizzly has suspended operations at Algar due to low commodity prices.

Phase 1	6,000	2014	Suspended	SAGD
Phase 2	6,000	TBD	Approved	SAGD
May River				

Grizzly responded to a third round of supplemental information requests regarding its May River application in early March. Regulatory approved is expected in 2015.

Phase 1	6,000	TBD	Application	SAGD
Phase 2	6,000	TBD	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Harvest Operations Corp.				
Blackgold				

Harvest says that the CPF was mechanically complete in early 2015 and minor pre-commissioning activities will continue at a measured pace through the year, but first steam is on hold until the heavy oil price becomes favourable.

Phase 1	10,000	TBD	On Hold	SAGD
Phase 2	20,000	TBD	Approved	SAGD
Japan Canada Oil Sands Limited				
Hangingstone				

The Hangingstone expansion will receive its diluent from Inter Pipeline's Polaris pipeline. Additionally, Aquatech has been awarded a contract to provide its evaporator technology for once-through steam generator blowdown treatment. First production is expected in 2016.

Expansion	20,000	2016	Construction	SAGD
Hangingstone Pilot				
Pilot	11,000	1999	Operating	SAGD
Koch Exploration Canada Corporation				
Muskeg				

Regulatory approval granted in June 2014.

Pilot	10,000	TBD	Approved	SAGD
Laricina Energy Ltd.				
Germain				

Laricina has suspended operations at the Germain SAGD project in order to reduce capital and operating costs as it continues its financial and strategic alternatives.

Phase 1 CDP	5,000	2013	Suspended	SC-SAGD
Phase 2	30,000	TBD	Application	SC-SAGD
Phase 3	60,000	TBD	Application	SC-SAGD
Phase 4	60,000	TBD	Application	SC-SAGD
Saleski				

According to a report by its court appointed monitor, PricewaterhouseCoopers, Laricina Energy plans to shut in the Saleski pilot by September 2015 in order to reduce costs. The company has been under creditor protection since March.

Experimental Pilot	1,800	2011	Suspended	C & SC-SAGD
Phase 1	10,700	TBD	On Hold	Cyclic SAGD
Phase 2	30,000	TBD	On Hold	IN SITU
Phase 3	60,000	TBD	Announced	IN SITU
Phase 4	60,000	2023	Announced	IN SITU
Phase 5	60,000	2026	Announced	IN SITU
Phase 6	60,000	TBD	Announced	IN SITU
MEG Energy Corporation				
Christina Lake				

MEG completed major turnaround work in the third quarter and achieved record production during the period of 87,768 bbls/d. The increase in production is primarily due to the successful ramp-up of Phase 2B and continued implementation of the RISER initiative.

Phase 1 Pilot	3,000	2008	Operating	SAGD
Phase 2A	22,000	2009	Operating	SAGD
Phase 2B	35,000	2013	Operating	SAGD
Phase 3A	50,000	TBD	Approved	SAGD
Phase 3B	50,000	TBD	Approved	SAGD
Phase 3C	50,000	TBD	Approved	SAGD
Surmont				

The Environmental Assessment Director has deemed the Environmental Impact Assessment report complete for MEG Energy Corp.'s Surmont Project.

Phase 1	40,000	TBD	Application	SAGD
Phase 2	40,000	TBD	Application	SAGD
Phase 3	40,000	TBD	Application	SAGD
Osum Oil Sands Corp.				
Sepiko Kesik				

Osum says it anticipates regulatory approval for Sepiko Kesik in 2015. EIA report has been deemed complete. The review took 91 weeks.

Phase 1	30,000	2018	Application	CSS & SAGD
Phase 2	30,000	2020	Application	CSS & SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
PTT Exploration and Production				
Mariana - Thornbury				
PTTEP says that the project is preparing for FEED activities.				
Phase 1	20,000	2021	Application	SAGD
Renergy Petroleum (Canada) Co., Ltd.				
Muskwa				
Renergy Petroleum received regulatory approval in January.				
Muskwa Experimental Pilot	TBD	2015	Approved	Steam co-injection
Statoil				
Leismer				
Demonstration	10,000	2010	Operating	SAGD
Commercial	10,000	2011	Operating	SAGD
Expansion	20,000	TBD	Approved	SAGD
Northwest	20,000	TBD	Disclosed	SAGD
Suncor Energy Inc.				
Chard				
Phase 1	40,000	TBD	Announced	IN SITU
Meadow Creek East				
Phase 1	40,000	2020	Approved	SAGD
Phase 2	40,000	2022	Approved	SAGD
Surmont Energy Ltd.				
Wildwood				
Phase 1	12,000	TBD	Application	SAGD
Value Creation Inc.				
Advanced TriStar				
ATS 1	15,000	TBD	Application	SAGD
ATS 2	30,000	TBD	Application	SAGD
ATS 3	30,000	TBD	Application	SAGD
DOEx (Demonstration of Excellence)				
Value Creation has filed an amendment to its regulatory approval to increase production capacity from 1,000 to 6,000 bbls/d.				
Pilot	6,000	2018	Application	SAGD/ADC
COLD LAKE REGION — IN SITU				
Baytex Energy Corp.				
Gemini				
Baytex has made the decision to decommission the Gemini SAGD pilot due to low oil pricing. The company says that since operations started last year the pilot has successfully captured the key data associated with its objectives. The company's primary objective was to confirm reservoir production capacity to support a commercial scale project. Following regulatory approval for the commercial project, any subsequent sanctioning decision will be considered in the context of the project economics in a higher commodity price environment.				
Pilot	1,200	2014	Suspended	SAGD
Commercial	5,000	TBD	Approved	SAGD
Birchwood Resources Inc.				
Sage				
Birchwood has until September 30, 2015 to submit a response to supplemental information requests related to the Sage regulatory application.				
Pilot	5,000	TBD	Application	Low-pressure SAGD
Canadian Natural Resources Limited				
Primrose & Wolf Lake				
Canadian Natural says that it continues to progress low pressure steamflood operations at Primrose Ease Area 1 as well as low pressure CSS operations at Primrose East Area 2, and that operations at Primrose East are meeting expectations.				
Wolf Lake	13,000	1985	Operating	CSS
Primrose South	45,000	1985	Operating	CSS
Primrose North	30,000	2006	Operating	CSS
Primrose East	32,000	2008	Operating	CSS

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Devon Canada Corporation				
Walleye				
Devon says the Walleye project is currently on hold.				
Phase 1	9,000	TBD	Approved	SAGD
Husky Energy Inc.				
Caribou				
Demonstration	10,000	TBD	Approved	SAGD
Tucker				
Husky says that work is continuing to increase production and improve returns, with a new sustaining well pad drilled to help offset natural declines. Overall production at Tucker has averaged about 15,000 bbls/d since the beginning of September 2015, compared to average production of about 6,000 bbls/d in 2010.				
Phase 1	30,000	2006	Operating	SAGD
Imperial Oil Limited				
Cold Lake				
Imperial says that production from the new Nabiye project continues to ramp up following its Q1 start up. The company has submitted an application to the AER for the expansion of the LASER treatment for implementation in 2017.				
Phase 1-10	110,000	1985	Operating	CSS
Phase 11-13	30,000	2002	Operating	CSS
Experimental SA-SAGD	TBD	2013	Operating	SA-SAGD
Phase 14-16	40,000	2015	Operating	CSS
Midzaghe	45,000	TBD	Announced	SA-SAGD
Osum Oil Sands Corp.				
Orion				
Osum plans to revise the approved well pad development sequence at Orion, deferring two originally planned pads and developing on new sustaining pad as well as three new pads to increase production to the approved 20,000 bbls/d.				
Phase 1	10,000	2007	Operating	SAGD
Phase 2	10,000	TBD	Approved	SAGD
Taiga				
Osum says that Taiga Phase 1 will be advanced in 2015-16 subject to financing.				
Phase 1	12,500	TBD	Approved	CSS & SAGD
Phase 2	12,500	TBD	Approved	CSS & SAGD
Phase 3	20,000	TBD	Approved	CSS & SAGD
Pengrowth Energy Corporation				
Lindbergh				
Pengrowth says that production at Lindbergh averaged approximately 14,000 bbls/d in Q3, and that the project remains on track to exit 2015 at approximately 16,000 bbls/d. The company declared the project commercial in May 2015.				
Pilot	1,260	2012	Operating	SAGD
Phase 1	11,240	2015	Operating	SAGD
Phase 1 Optimization	3,500	2015	Construction	SAGD
Phase 2 Expansion	34,000	TBD	On Hold	SAGD
PEACE RIVER REGION — IN SITU				
Andora Energy Corporation				
Sawn Lake				
Project partner Pan Orient Energy says that a regulatory application is being prepared for potential expansion of the project, increasing operations to eight well pairs and associated facilities. The application is expected to be filed by the end of January 2016.				
Demonstration	1,400	2014	Operating	SAGD
Expansion	TBD	TBD	Announced	SAGD
Baytex Energy Corp.				
Cliffdale				
Baytex says that operations at the Cliffdale CSS pilot were suspended in late September 2015.				
Pilot	2,000	2011	Suspended	CSS
Dawson				
Touchstone Exploration Inc. has disposed of its interest in the Dawson area of Alberta for cash consideration of $2.15 million				
Experimental Demonstration	TBD	2014	Suspended	CSS
Harmon Valley				
Pilot	TBD	2011	Operating	CSS

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Murphy Oil Company Ltd.				
Seal/Cadotte				
Murphy Oil says that during Q3, volumes from the Seal area were reduced due to the shut in of uneconomic wells and environmental monitoring together with natural decline.				
Pilot	TBD	TBD	Operating	CSS
Demonstration	12,450	2019	Application	CSS
Northern Alberta Oil Ltd.				
Sawn Lake				
Parent company Deep Well Oil & Gas says it is waiting on the preliminary results of the Sawn Lake SAGD pilot operated by Andora Energy to fine-tune the horizontal cyclic steam project design. Deep Well is a partner in the Sawn Lake project.				
Pilot	700	TBD	Approved	Horizontal CSS
Penn West Petroleum Ltd.				
Harmon Valley South				
In collaboration with its partner, Penn West has finalized the budget for the second half 2015 and first half 2016 development program in the area. Penn West's management is pleased to have the full support of its partner allowing for development to be accelerated in the play through the addition of a second rig to the program. The second rig is planned to start in September and carry through to the end of the year. Approximately 90 per cent of Penn West's expenditures continue to be paid for by our partner in the PROP joint venture.				
Pilot	TBD	2014	Operating	Horizontal CSS
Seal Main				
In collaboration with its partner, Penn West has finalized the budget for the second half 2015 and first half 2016 development program in the area. Penn West's management is pleased to have the full support of its partner allowing for development to be accelerated in the play through the addition of a second rig to the program. The second rig is planned to start in September and carry through to the end of the year. Approximately 90 per cent of Penn West's expenditures continue to be paid for by our partner in the PROP joint venture.				
Pilot	75	2011	Operating	Horizontal CSS
Commercial	10,000	TBD	Application	Horizontal CSS
Royal Dutch Shell plc				
Peace River				
Shell has suspended construction of the Carmon Creek project.				
Cadotte Lake	12,500	1986	Operating	CSS
Carmon Creek – Phase 1	40,000	TBD	Suspended	VSD
Carmon Creek – Phase 2	40,000	TBD	Suspended	VSD
NORTH ATHABASCA REGION — UPGRADER				
BP p.l.c.				
Terre de Grace				
BP stated in late 2014 that it is unlikely that Terre de Grace would come online before 2020.				
Pilot	8,400	TBD	Approved	CSS
Canadian Natural Resources Limited				
Horizon				
Canadian Natural plans to exit 2015 with Horizon volumes at 170,000 bbls/d and the Phase 3 expansion well advanced toward completion in Q4/17.				
Phase 1	110,000	2009	Operating	UPG
Reliability – Tranche 2	5,000	2014	Operating	UPG
Phase 2A	12,000	2014	Operating	UPG
Phase 2B	45,000	2016	Construction	UPG
Phase 3	80,000	2017	Construction	UPG
E-T Energy Ltd.				
Poplar Creek				
Bayshore Petroleum Corp. announces it has entered into a MOU with E-T Energy Ltd. to raise capital and implement a construction and operations program. The two objectives are to restart bitumen production at Poplar Creek during the second half of 2016, using E-T's proprietary ET-DSP technology and Bayshore's catalyst-based in situ cold catalytic cracking (CCC) upgrading technology and ultrasonic technology. The second objective is to construct a CCC upgrader designed to convert bitumen directly into ultra-low sulphur commercial diesel. The CCC upgrader does not use water, hydrogen, pressure/vacuum, or temperatures above 450 degrees Celsius. The produced diesel is intended for sale in local Canadian energy markets. Bayshore will issue, in due course, a comprehensive news release incorporating more detail of the project and transaction. One or more aspects of the final agreement may be subject to regulatory review and approval.				
Experimental Pilot	TBD	TBD	Announced	UPG

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Ivanhoe Energy Inc.				
Tamarack				
Ivanhoe has announced that despite considerable efforts by the company, its trustee and major creditors, the parties have been unable to reach a viable restructuring proposal under the Bankruptcy and Insolvency Act. The company was deemed bankrupt as of 11:59 p.m. MDT on June 1, 2015.				
Phase 1	34,784	TBD	Application	UPG
Suncor Energy Inc.				
Base Operations				
Suncor says that its overall oil sands production increased to 430,000 bbls/d in Q3 compared to 411,700 bbls/d in Q3/2014 due to higher in situ production and reliable operations across all assets. Both quarters included major planned maintenance.				
U1 and U2	225,000	1967	Operating	UPG
Millennium Vacuum Unit	35,000	2005	Operating	UPG
Millennium Coker Unit	97,000	2008	Operating	UPG
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
Canadian Oil Sands says that production during Q3 was impacted by a process fire in the interconnecting piping between the hydrotreating and environmental units at Syncrude's upgrader, which limited SCO shipments to minimal levels while damage was assessed and repaired. The company says that Syncrude is entering a new era of low cost operations, following a major period of reinvestment that will sustain production for decades.				
Base Plant Stage 1 & 2 Debottleneck	250,000	1978	Operating	UPG
Stage 3 Expansion (UE-1)	100,000	2006	Operating	UPG
Stage 3 Debottleneck	75,000	TBD	Announced	UPG
SOUTH ATHABASCA REGION — UPGRADER				
CNOOC Limited				
Long Lake				
Nexen says it has returned Long Lake to full operations following amendment orders from the Alberta Energy Regulator lifting suspension of pipeline operations. The suspension was ordered in late August after Nexen self-disclosed to the AER pipeline non-compliances, following a major spill in July.				
Phase 1	58,500	2009	Suspended	UPG
Value Creation Inc.				
Advanced TriStar				
ATS-1	12,750	TBD	Application	UPG
ATS-2	25,500	TBD	Application	UPG
ATS-3	25,500	TBD	Application	UPG
DOEx (Demonstration of Excellence)				
Value Creation has filed an amendment to its regulatory approval to increase production capacity from 1,000 to 6,000 bbls/d.				
Pilot	12,000	2018	Application	UPG
INDUSTRIAL HEARTLAND REGION — UPGRADER				
North West Upgrading Inc.				
Redwater Upgrader				
The Sturgeon Refinery construction site recently celebrated more than five million hours worked at site with zero lost time incidents. To date, more than 300 modules have been delivered to site, with over 230 having been placed on foundations. More than 600 additional modules are standing in various stages of assembly at various module shops. Module and equipment construction, receipt and placement will continue through the balance of 2015 and 2016.				
Phase 1	50,000	2017	Construction	UPG
Phase 2	50,000	TBD	Approved	UPG
Phase 3	50,000	TBD	Approved	UPG
Shell Albian Sands				
Scotford Upgrader				
Shell has made a final investment decision on the HCU debottleneck project, which is expected to increase hydrocracking capacity by about 20 percent. Project partner Marathon Oil says that planned turnarounds at the base upgrader and Muskeg River Mine were completed on time and on budget in Q2, as well as unplanned downtime at the expansion upgrader.				
Commercial	155,000	2003	Operating	UPG
Expansion	100,000	2011	Operating	UPG
Scotford HCU Debottleneck	14,000	TBD	Announced	UPG

GLOSSARY of oil sands terms

ASPHALTENES
The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

BARREL
The traditional measurement for crude oil volumes. One barrel equals 42 U.S. gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

BITUMEN
Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oil sand, but saturation varies.

COGENERATION
The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

COKING
An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

CONDENSATE
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

CONVENTIONAL CRUDE OIL
Mixture of mainly pentane and heavier hydrocarbons recoverable at a well from an underground reservoir, and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

CRACKING
An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

CYCLIC STEAM STIMULATION (CSS)
An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

DENSITY
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light-to-medium crude—oil above this density is deemed as heavy oil or bitumen.

DILBIT
Bitumen that has been reduced in viscosity through addition of a diluent such as condensate or naphtha.

DILUENT
A light hydrocarbon blended with bitumen to enable pipeline transport. See Condensate.

EXTRACTION
A process, unique to the oil sands industry, that separates the bitumen from the oil sand using hot water, steam and caustic soda.

FROTH TREATMENT
The means to recover bitumen from the mixture of water, bitumen and solids "froth" produced in hot-water extraction (in mining-based recovery).

GASIFICATION
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy by-products.

GROUNDWATER
Water accumulations below the Earth's surface that supply fresh water to wells and springs.

HEAVY CRUDE OIL
Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shipped by pipeline.

HYDROCRACKING
Refining process for reducing heavy hydrocarbons into lighter fractions, using hydrogen and a catalyst; can also be used in upgrading bitumen.

HYDROTRANSPORT
A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

HYDROTREATER
An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

IN SITU
A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

IN SITU COMBUSTION
An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then "push" the oil towards the recovery well.

LEASE
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oil sand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

LIGHT CRUDE OIL
Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30–33 degrees API (compared to 32–34 for Light Arab and 37–40 for West Texas Intermediate).

MATURE FINE TAILINGS
A gel-like material resulting from the processing of clay fines contained within the oil sands.

OIL SANDS
Bitumen-soaked sand deposits located in three geographic regions of Alberta: Athabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total in-place deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

OVERBURDEN
A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

PERMEABILITY
The capacity of a substance (such as rock) to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

PETROLEUM COKE
Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

PRIMARY PRODUCTION
An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

RECLAMATION
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

STEAM ASSISTED GRAVITY DRAINAGE (SAGD)
An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

SURFACE MINING
Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

SYNTHETIC CRUDE OIL
A manufactured crude oil comprised of naphtha, distillate and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

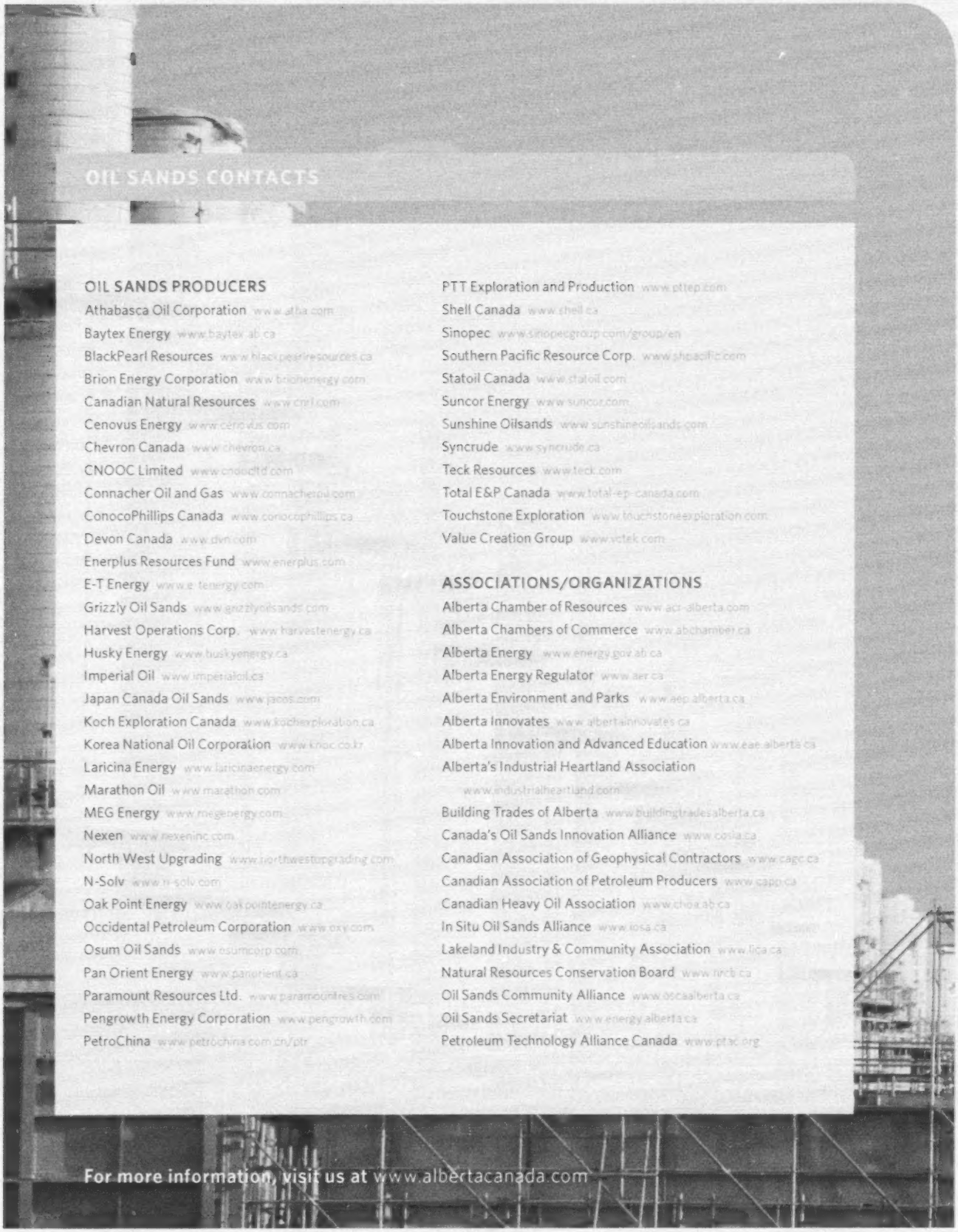
TAILINGS
A combination of water, sand, silt and fine clay particles that is a by-product of removing the bitumen from the oil sand through the extraction process.

TAILINGS SETTLING BASIN
The primary purpose of the tailings settling basin is to serve as a process vessel, allowing time for tailings water to clarify and silt and clay particles to settle so that the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

THERMAL RECOVERY
Any in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

UPGRADING
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

VISCOSITY
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.



OIL SANDS CONTACTS

OIL SANDS PRODUCERS

Athabasca Oil Corporation www.atha.com
Baytex Energy www.baytex.ab.ca
BlackPearl Resources www.blackpearlresources.ca
Brion Energy Corporation www.brionenergy.com
Canadian Natural Resources www.cnrl.com
Cenovus Energy www.cenovus.com
Chevron Canada www.chevron.ca
CNOOC Limited www.cnoocltd.com
Connacher Oil and Gas www.connacheroil.com
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Grizzly Oil Sands www.grizzlyoilsands.com
Harvest Operations Corp. www.harvestenergy.ca
Husky Energy www.huskyenergy.ca
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Japan Canada Oil Sands www.jacos.com
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Korea National Oil Corporation www.knoc.co.kr
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Oak Point Energy www.oakpointenergy.ca
Occidental Petroleum Corporation www.oxy.com
Osum Oil Sands www.osumcorp.com
Pan Orient Energy www.panorient.ca
Paramount Resources Ltd. www.paramountres.com
Pengrowth Energy Corporation www.pengrowth.com
PetroChina www.petrochina.com.cn/ptr
PTT Exploration and Production www.pttep.com
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Sinopec www.sinopecgroup.com/group/en
Southern Pacific Resource Corp. www.shpacific.com
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Suncor Energy www.suncor.com
Sunshine Oilsands www.sunshineoilsands.com
Syncrude www.syncrude.ca
Teck Resources www.teck.com
Total E&P Canada www.total-ep-canada.com
Touchstone Exploration www.touchstoneexploration.com
Value Creation Group www.vctek.com

ASSOCIATIONS/ORGANIZATIONS

Alberta Chamber of Resources www.acr-alberta.com
Alberta Chambers of Commerce www.abchamber.ca
Alberta Energy www.energy.gov.ab.ca
Alberta Energy Regulator www.aer.ca
Alberta Environment and Parks www.aep.alberta.ca
Alberta Innovates www.albertainnovates.ca
Alberta Innovation and Advanced Education www.eae.alberta.ca
Alberta's Industrial Heartland Association www.industrialheartland.com
Building Trades of Alberta www.buildingtradesalberta.ca
Canada's Oil Sands Innovation Alliance www.cosia.ca
Canadian Association of Geophysical Contractors www.cagc.ca
Canadian Association of Petroleum Producers www.capp.ca
Canadian Heavy Oil Association www.choa.ab.ca
In Situ Oil Sands Alliance www.iosa.ca
Lakeland Industry & Community Association www.lica.ca
Natural Resources Conservation Board www.nrcb.ca
Oil Sands Community Alliance www.oscaalberta.ca
Oil Sands Secretariat www.energy.alberta.ca
Petroleum Technology Alliance Canada www.ptac.org

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